#17

A

Dissertation

Passed March 28th
1827
W. R. H

on

Traumatic Tetanus

by

Joseph Mechlin junr.

of

Washington City

The following imperfect remarks on Traumatic Tetanus, which, in compliance with a long established regulation of this University, I now submit to the consideration of the Faculty, will at the first glance be seen to be almost entirely eclectic, a circumstance necessarily attendant upon a great majority of inaugural dissertations not of an experimental nature. The authorities within my reach have been carefully consulted, and such remedies and modes of treatment as appeared to have been most successful have been selected —

The pathology of the disease has been purposely omitted. This being a point on which the most enlightened practitioners have not been able to come to any satisfactory conclusion, it could scarcely be expected that the crude speculations of a mere tyro

would tend to elucidate it; indeed any attempt to obtrude them upon the notice of the scientific board for whose inspection these pages were prepared would not only be superfluous but highly ridiculous.

Tetanus is a term derived from the Greek and is used to denote a permanent spasmodic contraction of the voluntary muscles, occurring with more or less violence, being either partial or general, and accompanied with great rigidity of the parts affected.

It is divided into Idiopathic or primary, and Symptomatic or secondary also called Traumatic, the former often arising without any ostensible cause, the latter being the result of some mechanical injury, and is that to which the following observations will be chiefly confined.

There are some modifications of Tetanus on which the older nosologists founded different species of the disease. Thus, a spasmodic rigidity of

the muscles of the jaw was denominated Trismus; when the muscles of the back were chiefly affected with spasm the body being bent backwards it was termed Opisthotonos, and when the disease was in a great measure confined to the flexors of the trunk and extremities; the body being flexed forwards it was recognised by the appellation of Emprosthotonos - There is another form which however occurs very rarely it is where the tetanic rigidity is limited to the muscles of one side only, constituting the Tetanus lateralis of Sauvage the Pleurosthotonos of some others. The term tetanus was considered as strictly applicable only where the spasm was nearly universal keeping the body rigidly extended - These different terms are however at present regarded as expressing merely varieties of the same disease, arising from the same causes, differing only in severity, and requiring the same mode of treatment for their cure -

Tetanus is also divided into acute and chronic, which is by far the most important distinction,

the former being almost uniformly fatal while the latter, from the gradual accession of the symptoms affords more time for the exhibition of remedies and holds out greater prospects of a successful termination

Although the cause of the disease is implied in the term traumatic, yet in considering the origin of tetanus, we should take into view the kind of wound, the part in which it is situated, as well as the climate, situation, physical conformation, &c all of which exercise a considerable influence in its developement - thus it most frequently succeeds punctured or lacerated wounds particularly of the extremities, also wounds of the ginglimoid articulations with lacerations of the ligaments & compound fractures and dislocations - Mr Hennen observes that wounds below the elbow and knee have been those which he has seen most frequently followed by tetanus, Baron Larrey speaking of tetanus as it occurred in Germany remarks that "the young soldiers were most obnoxious

to it who had been wounded in the gingival arteries
=tions or deeply in the soft parts with lapse of substance"
The same author has observed a circumstance which
appears not to have been before noticed; it is when
a wound causing tetanus injured nerves on the face
near of the body Emprosthotonos was occasioned, but that
Opisthotonos succeeded, when the posterior nerves were injured
and complete or universal tetanus followed when
there was a lesion of both descriptions of nerves by the
wound extending quite through the limb. Although
there can be no doubt that Larrey observed this
fact to have occurred in a few instances, still it is
highly improbable that there is any necessary connection
between the form of the disease and the situation of the
wound, for it is well known that we have enumerated the numerous
causes of this disorder recorded by surgical writers that
tissues, Opisthotonos, & Emprosthotonos are universal
tetanus, such can take place without any regard to
the situation or extent of the wound; but in many

instances occur successively in the same patient and as consequences of the same injury; nor is it at all probable that so remarkable a circumstance would have escaped the notice of the numerous writers who have treated of this complaint; the experience of some of whom was at least coextensive with that of Larrey. The truth is that these different forms are to be regarded as merely marking the intensity and progress of the disease. Emprosthotonos & opisthotonos are only occurring in the more advanced and violent cases.

Tetanus also occasionally succeeds amputation, in this case it has been supposed to originate from the inclusion of a nerve in the ligature and in some instances this has been found to be the fact. Baron Larrey has recorded the case of the son of General Damnagnac who died of tetanus consequent to amputation and upon examining the stump the median nerve was found included in the ligature

with the artery with its "tremulous nodules and scarlet" may however be much doubted whether this in general can be considered as a legitimate cause of the disease, as the application of ligatures to nerves is an accident of frequent occurrence, particularly in military surgery, where the operation is generally performed in a rapid manner, and more especially in the navy, where in addition to the hurry and confusion of battle the operator has not the advantage of a very good light, yet tetanus after amputation is comparatively rare. Mosely remarks on this subject "I have lost many patients in the locked jaw after amputations and never found tearing out the nerves whether ligatures were made or not caused the smallest difference in the event nor even any security against the lockt jaw" In this opinion the majority of practitioners appear to coincide, yet, it would seem from the statements of Larrey that the inclusion of nerves may and does occasionally, though, rarely, exist in the development of the disease where a strong predisposition to it exists, or where

the climate, season, or situation, are favorable to its production, for this reason as well as on account of the inconvenience resulting from the too long retention of the ligatures, prudence would dictate to us to avoid wherever it may be practicable the application of ligatures to wounds.

Tetanus is a disease which occurs in every part of the world, yet experience proves that it is more frequent in warm, than in cold or temperate climates. Between the tropics it is the ordinary consequence of all kinds of wounds, succeeding even the most trivial injuries. Dr Rush considering tetanus as essentially a disease of debility ascribes its prevalence in tropical climates to a relaxation of muscular fibre caused by excessive heat, in which relaxation he supposes the predisposition to it to exist; be this as it may, the disease is not only of more frequent occurrence in warm climates but its danger and intensity are also increased. Larrey found that tetanus in Egypt was more violent and bore a greater resemblance to Hydrophobia than in the colder climates.

February and that it was most apt to occur when the weather or temperature passed from one extreme to another. He also mentions the powerful influence which situation has in developing the disease, agreeing in this with Boyer who says that "it is more common in marshy and maritime places than in those which are dry, elevated, and at a distance from the sea" This is also the opinion of most other writers who have had much experience with it —

Persons of both sexes, every age and condition, are liable to this disease but ceteris paribus it is more apt to attack the robust and muscular, and persons accustomed to live in their those of contrary make & habits, and it is partly on this account, as well as from their being less exposed to the exciting causes that it occurs less frequently in women than men —

Traumatic tetanus is generally slower in its approach than the Idiopathic — In some

in instances it comes on suddenly and with great violence, the most remarkable case on record is that mentioned by the late Sir Astley Cooper of a lady in which the patient was a negro who scratched his thumb with the edge of a broken plate and died of tetanus in fifteen minutes after the receipt of this trivial injury. But more commonly its approach is gradual, being often eight or ten days and occasionally a much longer time from the infliction of the wound to the appearance of the first symptoms and this frequently happens when the effects of the injury have subsided when the wound has healed and no pain or uneasiness remains.

Usual first slight stiffness is felt in the back of the neck and about the shoulders which gradually increasing impedes both the rotation and flexion of the head upon the neck, this is often mistaken for rheumatism which it much resembles, but it is attended with a sense of lassitude and debility. The rigidity now extends to the muscles of the jaw and thorax so

that mastication and deglutition become difficult and painful. about this time there is a sudden and violent pain shooting from the lower part of the sternum to the spine, this is felt from time to time and at each recurrence there is an aggravation of all the other symptoms. the muscles of the neck and jaw are immediately thrown into violent spasmodic action. the head is forcibly retracted, and the jaws are firmly closed. These periodical attacks of spasm become more and more severe, and their effects more lasting, so that the head is fixed in a state of retraction and the jaws are placed in permanent apposition, the teeth being set so firmly together as not to permit the least separation. These symptoms constitute what may be called the first stage of the disease which sometimes occupies several days, at other times it establishes itself with all its most violent symptoms in a few hours in which case the patient seldom survives beyond one or two days —

The commencement of the disease is marked by an increase of the spasms of the diaphragm both as to frequency and force and is accompanied by a more forcible retraction of the head and by rigidity of the muscles ~~of the~~ ~~[illegible]~~ of the back and dorsum, and to those of the lower extremities: these by the force of their contractions frequently elevate the body in the form of a bow resting only upon the head and heels, a state which is more particularly designated by the term Opisthotonos. In a very short time a remission occurs, yet it is not so complete as to allow you to flex the patients limbs. The spasms of the muscles on the sides and fore part of the neck still continue, but their action is in a great measure overcome by the number and strength of the posterior muscles. The respiration is hurried and the pulse is small, fluttering and irregular but both become more calm slow and natural during the remission. The face though sometimes pale in the intervals is generally flushed and the whole countenance exhibits the strongest expression of the most

melancholy distress, the patient generally desires to lie as still as possible and to avoid all attempts at drinking, speaking or any kind of motion as these are very apt to induce a return of the spasms—

The flexors of the neck & the muscles that depress the lower jaw become affected in the progress of the disease. The abdominal muscles are also involved in the same tetanic rigidity, so that the abdomen is retracted towards the spine and feels hard like a piece of board. The spasmodic contraction of these and the other flexors becoming sufficiently powerful to overcome in a great measure the action of the extensors is a circumstance which indicates the advance of the disease; the body and limbs are rigidly extended a condition to which the term Tetanus was formerly considered as alone strictly applicable— The disease has now scarcely any remission and the patient suffers the most excruciating torments— The recti muscles of the abdomen often contract unequally giving the appearance and feel of hard tumours

in different parts. The muscles of the lower extremities though in a state of the most rigid contraction at this period are occasionally thrown into such violent action during the paroxysm that, if not prevented by the attendants the patient would be precipitated off the bed, or would be pushed upwards with such an impetus as to strike his head with great force against any opposing object. Sometimes though rarely the action of the flexor muscles overcomes that of the extensors and the body is bent forward the chin resting on the breast, this occurs only in the most violent forms of the disease and constitutes the Emprosthotonos of the nosologists —

In the most violent cases all the voluntary muscles are affected, the features are variously altered, the forhead is drawn up into wrinkles, the eyes are either fixed in their orbits or distorted, the alæ of the nose are drawn up and the cheeks retracted towards the ears. The tongue is suddenly protruded between

the teeth and often severely lacerated by the jaws spasmodically closing at the same moment; the eyes are watery and languid and a froth which is sometimes tinged with blood issues from between the lips — When tetanus arrives at this stage or more continued or violent spasm, generally closes the scene, or should there be too much exhaustion to admit of this mode of termination delirium supervenes, when death is preceded by a general muscular relaxation. —

One of the circumstances attending this disease most worthy of notice, is, that there is scarcely any function except that of muscular action primarily affected, the senses and appetites are perfect, the intellect is undisturbed, and the natural functions are equally exempt from disorder, fever rarely attends, the pulse being not in the least altered in the early stage of the complaint when only a few muscles are affected with spasm; it becomes accelerated only when the disease is nearly universal, and this merely in consequence

advances, it becomes covered with a cold sweat; vomiting also occasionally takes place in the beginning but this soon subsides, and it is usual for the appetite to remain unimpaired throughout the whole course of the disorder, and the food that may be taken to be well digested. The different excretions are also affected. the urine (which is said to be high coloured and more or less turbid) is voided with pain and difficulty, owing most probably to a spasmodic affection of the sphincter of the bladder at other times its secretion is suppressed - Obstinate constipation prevails in every instance and the most powerful cathartics are required to overcome it; Boyer thinks that this is most probably owing to a spasm of the intestines others attribute it to the opium which is usually administered for the cure of the disease but this latter does not appear at all probable, from the circumstances that constipation prevails to a great degree in cases where opium is not resorted to. but there can be

of the mechanical action of the muscles upon the blood vessels, which, it is well known will hurry on the circulation and throw the blood upon the heart in greater quantities, rendering the pulse more frequent and irregular, the respiration as might be expected is hurried from the same cause and the temperature of the body increased. That these symptoms are not the result of febrile excitement is rendered very evident from the state of the blood which when drawn does not exhibit the buffy coats as in the inflammatory diseases, as well as from the entire exemption from the functional derangement which usually attends the pyrexia. In some rare instances when the disease is very violent there is more or less of febrile action, but this is more frequently the case in the Idiopathic than in the Traumatic species of the complaint—

In the early stages of tetanus the state of the skin is perfectly natural, but as it

no doubt that it is aggravated by the use of this medicine —

The most prominent symptoms of tetanus have been enumerated, and it only remains to notice some of the premonitory signs — those as the acute form of the disease when once established is so uniformly fatal are of the highest importance, and we should sedulously attend to whatever may warn us of its approach in order to avoid an attack —

It has been remarked by Richerand that a continued extension of the limbs during sleep in wounded persons is often a precursor of tetanus and usually manifests itself some time before the muscles of the jaw and throat are affected — this is a symptom to which we should pay particular attention when there are gunshotted or lacerated wounds particularly of the lower extremities — some premonitions of danger may also be derived from the increase of pain, irritation and restlessness, severe twitchings, difficulty of

deglutition or in the motions of the head, pain at the scrobiculus cordis, also the suppressed or irritated discharge from the wound; Larrey has recorded several instances where tetanus was preceded either by a dry state of the wound or where it afforded only a very deficient serous discharge and Dr Reid in the Edinburgh Medical & Surgical Journal observes, that on the removal of the dressings the wound was found to be covered with a dark coloured unhealthy looking matter and that he had noticed this appearance to precede tetanus in two other instances-

The post mortem examinations of those who have died of tetanus have afforded very little information, respecting the nature of the disease, sometimes slight effusions are found within the ventricles, the asphyxiatus and villous coat of the stomach are generally more or less inflamed, but this appearance is not confined to this disease, it is frequently met with in cases of sudden and violent death; in

addition to this Baron Larrey found the pharynx and oesophagus much contracted and covered with a viscid reddish mucus - in several instances a considerable number of lumbrici were found in the intestines these he thinks may have aggravated the disease. — Mr Kennedy holds the following language respecting post mortem appearances. "In the dissections I have made of this disease I have been much disappointed. I never found any peculiar appearance in the wounds themselves except in one instance when the radial nerve was somewhat thickened and a small splinter of bone was sticking in it, the man lived six weeks" (The inflamed or lacerated appearances frequently observable in the stomach, fauces, larynx &c, appeared to him to be occasioned more by an increased flow of blood to them consequent on their increased action than from any other cause

(Reid of Leith found the membranes investing the spinal marrow much inflamed and a

considerable effusion of blood into the cellular tissue connecting the dura mater with the vertebræ, and in some places he observed a reddish substance resembling medullary matter effused between the tunica arachnoidea and pia mater which he could wipe off on breaking the membrane investing it, but could not discover the slightest rupture in the pia mater or any of its vessels; the only appearance remarkable in the medulla spinalis itself, was that its cortical and medullary portions had a deeper tinge than natural —

There is a curious case recorded by Hawkins in the 22nd vol of the Edinburgh Medical & Physical journal where on dissection the heart was found to be firmly contracted, evidently partaking of the tetanic rigidity of the voluntary muscles —

Prognosis — this will in general be unfavorable, but more especially so when the disease forms quickly, and soon attains its most violent stage, the danger

being proportioned to the rapidity of the attack; patients thus situated generally die in twenty four or forty eight hours, rarely surviving beyond the third day; but when the disease comes on slowly and the symptoms are gradually developed and the patient survives after the tenth or twelfth day there is a greater hope of a successful termination. The state of the circulation so much insisted on by Dr Parrys as indicating the degree of danger appears from the statement of Mr. Bennett not to be entitled to the slightest confidence he remarks - "From the state of the pulse I have derived no clue to either the proper treatment or the probable event; it has in the cases I have met with been astonishingly unaffected; from the state of the skin I have been left equally in the dark, sweating which some have imagined critical I have seen excessive during the whole course of the disease and attended with a most pungent smell while in others it has never appeared at all"

Concerning the Diagnosis scarcely any thing need be said. The permanent spasmodic closure of the jaws, the rigidity of most of the voluntary muscles, particularly those concerned in mastication and deglutition, the pain shooting from the lower end of the sternum to the spine, the appetite remaining unimpaired, the digestive as well as almost all the other functions being well performed, and the entire exemption from cerebral disorder and febrile excitement; are symptoms sufficiently characteristic & will always prevent us from mistaking the disease.

The treatment of tetanus next claims our attention. This is subject abounding in difficulties which in the present state of our knowledge of the nature of this disease we can scarcely hope to overcome. When we reflect upon the obscurity in which the pathology of tetanus is involved and the little light that has hitherto been thrown on it by dissections we will no longer wonder that our practice is almost

entirely empirical or that there should be such a number of opposite remedies proposed for its cure & that so many different modes of treatment founded entirely upon speculative reasons, should each in their turn have enjoyed only a short lived reputation. For it is not by plausible theories nor by speculative powers be they never so brilliant that the obscurity which shrouds this subject is to be dispipated and the difficulties by which it is surrounded surmounted. This can only be done by patient research and accurate observation, and it becomes the duty of those who have the opportunity faithfully to collect and arrange all the facts that may lead to its elucidation.

The indication of cure applicable to most other diseases (viz) the removal of the exciting causes) cannot be of any avail in this, which, for the most part consists in a morbid condition entirely independent of them, or should they still continue to operate

are in a great measure beyond our control. The disease often refuses to yield to any mode of treatment and the same remedies which have been successfully employed in some cases have not been productive of the slightest benefit in others to all appearance precisely similar. Where there is any suspicion that the local irritation is still acting, the best mode of counteracting its effects would be to intercept by suitable incisions all nervous communication between the wounded part and the sensorium. But when the disease is once fully formed and the violent symptoms have supervened experience has abundantly shown that this will be of no service. Even amputation the efficacy of which in arresting the march of the disease has been so much extolled will not under such circumstances procure even any mitigation of the symptoms. Larrey the most strenuous advocate of amputation in tetanus arising from a wounded extremity expressly limits the operation to chronic tetanus, when he says it may be

advantageously practiced "in an stage of the disorder provided the operator chose a period when the symptoms intermit" and to the incipient stage of acute tetanus; he remarks "it will not succeed as well in acute tetanus if it be advanced and the muscles of the limb to be amputated be strongly contracted and rigid" he cites a few instances of chronic tetanus that refused to yield to the ordinary mode of treatment but which were completely cured by amputation, there are also a few cases recorded by other writers in which amputation was successfully practiced Mr. Hennen states that he saw a case in which this operation was attended by the happiest results; yet notwithstanding the partial success that has attended the operation it is not probable that it will be generally adopted it has been tried extensively in the British army but without success, Sir Astley Cooper also disapproves of it in the most pointed manner the death of the patient seemed to him to be accelerated by amputation

in a case of tetanus arising from a compound fracture just above the ankle and in another case which came under his notice the finger was amputated without any benefit resulting. he also heard of a third instance where the operation was attended with same want of success; he remarks in conclusion "There is a species of chronic tetanus which some=times even succeeds wounds and which will occasion=ally get well and apparently it recovers, even if little be done by medicine and nothing by surgery. and in such a case it would not be justifiable to amputate as the patient will get well without it" from this it would appear that amputation is at best not only a very uncer=tain means of cure but may, and occasionally does aggravate the symptoms, and should never be resorted to in preference to other milder remedies the superior efficacy of which is so well attested and that nothing short of the assurance that this was the only means of saving the patients life would justify the performance

of so severe an operation as this can apology be deemed, being of an important character —

With regard to incisions for the purpose of completely dividing the wounded nerve and cutting off all communication with the sensorium, Larrey advises that they should be made before inflammation has come on, for when this has taken place he asserts they are not only useless but even injurious; they should as far as is practicable include all the nervous elements, but he is decidedly opposed to all incisions into joints as aggravating the disease - he has adduced some instances strikingly illustrative of the efficacy of this practice, one in particular where the supra orbitar nerve was injured by a thrust from a lance symptoms of tetanus supervened but were promptly arrested by making an incision down to the bone dividing the vessels and nerves —

As an early and highly irritable condition of the wound has a tendency to induce

blood as well as that state of it in which the discharge is of an unhealthy character or altogether suppressed. The indications here are to allay local irritation and restore the healthy secretion. Thus, mechanical causes of irritation such as splinters of bone, balls and other extraneous substances, should be removed as soon as possible. Poultices and other emollient applications have been recommended for the purpose of allaying the local inflammation and establishing a healthy discharge, their efficacy however appears very doubtful so much so that it was the practice of Dr Rush to endeavour to excite inflammation in the wound and for this purpose he directs that it should be diluted and dressed with the oil of turpentine, a mode of treatment that has proved to be of the greatest utility in the extensive experience of some of our most eminent surgeons. Dr Larrey advises blisters as near as possible to the injured part and particularly, when results in the incipient stage of the disease the application of

Epispastic continued to the wound itself — for the purpose of doing away the local irritation he was in the habit of applying the fomentation as well as the actual cautery — he restricts the use of caustics to the early stage of the disease and in applying them directs that we should observe the same rules as in making incisions; with respect to employment of the actual cautery, he makes the following remarks "When I suspect the existence of a nerve to be entangled in the neighbouring vessels or by the adhesion of parts of the cicatrix I do not hesitate to apply the actual cautery until I reach the limit of the disordered nerve and sometimes I carry the cautery even to a greater depth this application justly recommended by the philosophers of antiquity has produced most surprising effects — By destroying the adhesions and preventing the twitching of the nerve it removes spasm and irritation" [illegible]

complete although this remedy has only been tried in a few instances, yet from the uniform success that has attended it, it seems to become a very important addition to our means of arresting this intractable disease, and it is due to the high professional standing of him who recommends it that it should receive a more extensive trial. —

Cataplasms of tobacco leaves applied to the wounds appear from the experience of Larrey to be entirely inert; he also found that blisters applied to the throat in tetanus did not arrest its progress.

The principal topical remedies have now been enumerated: a greater diversity of opinion seems to prevail respecting the constitutional mode of treatment yet it is from the general rather than from the local treatment that the cure of tetanus when it is once fully formed can be anticipated. — The seat of the disease being transferred from the local injury to the nervous system generally we should

endeavour by making a powerful impression on these organs to excite a new action which will subvert their existing morbid condition. The remedies which have been found most effectual in the cure of tetanus are those which exert the most powerful influence on the nervous system, such as the narcotics, diffusible stimuli, bleeding, purging &c. these have all been employed either singly or variously combined, yet the success that has attended their exhibition has in general been very limited.

Opium is the remedy which has been most successfully employed and in which the majority of practitioners place the most confidence. to be of any service its exhibition should be commenced on the very first accession of the symptoms. the doses large and repeated at short intervals: it is however generally recommended and is perhaps the better practice to commence with comparatively moderate doses, as sixty drops of Laudanum repeated at short intervals rapidly

increasing the quantity until some immediate effect is produced. The necessity for the rapid augmentation of the dose will be shown when we reflect with what celerity the disease advances to its most violent stage, and that no time should be lost in arresting its progress which there is any chance of our remedies having any effect. The firm closure of the jaws, the spasmodic rigidity of the muscles concerned in deglutition, the increase of which may soon render the introduction of medicines into the stomach impracticable, are additional motives for pushing our remedies to the utmost before these impediments arise. When we find it impossible from the above mentioned causes to administer the medicine per oram we should resort to opiate enemata

Persons labouring under tetanus will take with impunity immense quantities of opium which under other circumstances would certainly prove fatal, cases are recorded where gxxxxxx have been administered every two or three hours for

several days in succession; an instance of this kind is recorded in the 1st. Vol. of the Edinburgh Medical Commentaries where the patient took eight hundred grains of opium in seventeen days over this without its producing any of its narcotic effects upon the innovacuative medicines should always be employed to obviate the costiveness which uniformly attends this disease and is aggravated by the use of opium. But when we have reason to suspect the disease to be aggravated by an accumulation of irritating seeds in the intestines it would perhaps be better to administer a full dose of some brisk cathartic and afterwards employ laxatives in doses sufficient to keep the bowels soluble.

The rest of the narcotics as well as many of the antispasmodics have also been employed such as Digitalis, Cicuta, Nauseh, Camphor, Ether &c. either alone or in combination, but in general with very little success they are however useful as auxiliaries to the opiate treatment.

Mercury is a remedy which at one time was in considerable repute and still has its advocates, yet it has so often failed in procuring any alleviation of the symptoms that it cannot be relied on; it is to be administered internally and at the same time frictions with the Unguent: Hydrarg: are to be employed there are a few cases on record where this treatment appeared to be beneficial, yet in none of them was mercury solely used, so that we cannot attribute the successful termination of those cases entirely to the curative powers of this medicine; on the contrary there are several instances related by Mowship in the Edinburgh Medical & Physical Journal where it entirely failed, though the system was decidedly brought under the mercurial impression, one in particular which terminated fatally notwithstanding the patient was in a state of complete salivation thirty six hours before he died; Larrey says that mercurial frictions appeared to aggravate the disease and the opinion of Moseley respecting

mercurial inunction is as follows "I suspect those who have recovered when this remedy has been used would have recovered without it: for many people have been attacked by tetanus in the West Indies under a course of mercury" —

Another mode of treating this complaint consists in the liberal use of the most powerful tonics and stimulants as Bark, wine, brandy, Ether, the preparations ammonia &c this plan of treatment was introduced by Dr Pusta who considered the disease to be dependent on debility: he particularly recommends the free employment of wine and bark, and in his hands this practice had considerable success there are also several cases recorded by Dr Hosack in the 2d vol of the Medical Repository where it was attended with the happiest results —

Dr Reid of Dublin considering the disease to be seated in the Medulla Spinalis and its investing membranes which he had observed

in his dissections to exhibit appearances of inflammation, advises the application of a blister along the whole course of the spine. a mode of treatment very analogous to this has been highly spoken of in this country it is the application of caustic along the spine and in some instances it has been very successful —

Venesection in the opinion of some is a remedy of considerable efficacy. Dr Dickson in the 7th vol of the Medico Chirurgical transactions advises bleeding and purging, in a plethoric habit when the wound is painful and inflamed; several instances are recorded by Larrey, Guthrie and others where venesection was found to be very serviceable as a palliative and in one case which occurred in the practice of Mr Guthrie a cure was effected by bleeding the patient several times ad deliquium animi. The success however that has attended it is much too limited to place it in competition with the other remedies whose superior efficacy has been so amply tested; it had a fair

trial in the British army during the peninsular war and so often failed in making any impression on the disease that little reliance can be placed on it. The only case in which it seems to be indicated (are this: only cases) is where there is an inflammatory diathesis present, here, the exhibition of opium and the diffusible stimuli should be preceded by venesection & purging —

Among the remedies for tetanus it may not be amiss to notice the cold and warm bath; Mr. Hennen approves of the latter as an auxiliary to opium, but from the testimony of most writers it appears to be very inefficient, in some cases it is said to have afforded relief but this was merely temporary; the employment of the cold bath is a practice sanctioned by Dr. Wilson, Cochrane, Currie and many others; of its utility in idiopathic tetanus we have the strongest evidence but it does not appear to be at all suited to the traumatic form of the disease,

Mullen is decidedly opposed to its employment in tetanus arising from wounds, & Larrey relates a case which not only shows its inutility but also the pernicious effects that may result from its employment, in this case the tetanic rigidity was not only increased but such violent convulsions were excited as to rupture one of the recti muscles of the abdomen. In the few trials that have been made of the cold bath in this country it has been found to be wholly inade=
=quate to the cure of the disease —

The principal remedies as well as some of the most approved modes of treatment have now been cursorily noticed, and from what has been said it may be inferred that opium is the remedy entitled to the largest share of our confidence, and should from its almost universal recommendation as well as the success that has attended its exhibition be regarded as of primary importance in the manage=
=ment of this complaint. The other remedies which some

have regarded as of independent value are to be considered merely as adjuncts, any influence they may possess in arresting the progress of the disease can as they are not incompatible be fully secured by uniting them with opium —

Concerning the topical remedies it appears that most authorities agree as to the propriety of incisions for the purpose of dividing any wounded nerve; but to be of any service they should be made in the incipient stage of the disease. The free dilatation of the wound and the stimulating applications recom= =mended by Rush and Larrey should never be neglected these failing or should circumstances occur which the latter of the above mentioned authorities considers as justifying its employment it would perhaps be as well to resort to the actual cautery. But it must be confessed that do as we will exhaust all the resources of Medicine and Surgery the disease will not in a great majority of instances prove amenable to any

mode of treatment and must still be regarded as entitled to a high rank among the opprobria medicorum

K